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September 14, 2004

By Hand

Ms. Mary L. Cottrell
Secretary
Department of Telecommunications & Energy
One South Station
Boston, MA 02110

Re: D.T.E. 03-128
Petition of New England Power Company

Dear Ms. Cottrell:

On behalf of USGen New England, Inc. ("USGenNE"), I enclose for filing in the above-referenced docket one original and one copy of the Initial Brief of USGen New England, Inc.

Kindly date stamp the enclosed copy of this letter and return same to our messenger.

Thank you for your attention to this matter.

Sincerely,

Mary Beth Gentleman

MBG:jrd
Enclosures
cc: Selma Urman, Hearing Officer (6 copies)
Deidre Matthews, Director, Siting Division (1 copy)
William Febiger, Technical Director, Siting Division (1 copy)
Jolette Westbrook, General Counsel, Siting Board (1 copy)
Amy Barad, Analyst, Siting Division (1 copy)
Louis M. Arak, Project Manager (1 copy)
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COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

D.T.E. 03-128

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing documents upon all persons below in accordance with the requirements of 220 C.M.R. § 1.05 and the procedural rules in this docket.

Dated at Boston this 14th day of September, 2004.

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COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

D.T.E. 03-128

Petition of New England Power Company Pursuant to Mass. Gen. L. c. 40A, § 3 for Exemption from the Zoning Ordinance of the City of Salem

INITIAL BRIEF OF USGEN NEW ENGLAND, INC.

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Boston, Massachusetts
September 14, 2004

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Petition of New England Power Company Pursuant to Mass. Gen .L. c. 40A, § 3 For Exemption from the Zoning Ordinance of the City of Salem	)	D.T.E. 03-128

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I. INTRODUCTION

The zoning exemption sought in this case presents a unique set of circumstances. Typically, in determining whether a proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. *Save the Bay, Inc. v. Department of Public Utilities*, 366 Mass. 667, 860 (1975) ("*Save the Bay*"); *Town of Truro v. Department of Public Utilities*, 365 Mass. 407 (1974). Here, too, the general public interest must be balanced against local interests. However, in this case, the Department must also balance the interests of two public service corporations ("PSCs"). The applicant, New England Power Company ("NEP" or the "Company"), which has previously been found to be a PSC[1], has an interest in maintaining adequate voltage levels on its transmission system on the North Shore. USGen New England, Inc., also a PSC[2] in its capacity as the owner of Salem Harbor, has an interest in operating Salem Harbor Station ("Salem Harbor") reliably to serve the generation and voltage support needs of the North Shore and Greater Boston Import areas.[3]

In balancing the interests of these two PSCs, the Department must determine whether the proposed capacitor bank is actually needed for NEP to maintain adequate voltage levels on the North Shore and, if so, whether it can be built and operated without adversely affecting the reliable operation of Salem Harbor. In the context of G.L. c. 40A, § 3, the critical test in this case is whether NEP has met its burden of demonstrating that the proposed project is reasonably

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[1] *New England Power Company*, D.P.U. 92-255, pp. 2 and 20 (1994)

[2] *USGen New England, Inc.*, D.T.E. 03-83, June 22, 2004 at 15.

[3] The Department has previously found that in light of the ISO New England's finding that Salem Harbor is necessary to ensure the reliability of the New England electric grid, USGenNE's operation of Salem Harbor "provides a service with significant public benefits." *Id.* at fn. 8.

necessary for the public convenience or welfare. Based on the record in this case, USGenNE submits that NEP has not made that demonstration. NEP's initial filing demonstrated a need for the proposed capacitor bank based solely on outdated assumptions regarding other planned upgrades for the North Shore. Using corrected assumptions, it has become abundantly clear that there is no need to add a 126 MVAR capacitor bank at Salem Harbor in the proposed timeframe. Although NEP is still clinging to its position that the project is needed, its rationale for need is inconsistent with the plain language of the voltage schedule requirements of NEPOOL Operating Procedure 12 ("OP-12"). It also hinges on the immediate retirement of all units at Salem Harbor Station. The weight of the evidence in this case does not support that extreme contingency as a reasonable basis for need. Consequently, NEP has failed to demonstrate that this project is reasonably necessary for the public convenience or welfare.

II. STANDARD OF REVIEW

G.L. c. 40A, § 3 provides, in relevant part, that

> Land or structures used, or to be used by a public service corporation may be exempted in particular respects from the operation of a zoning ordinance or by-law if, upon petition of the corporation, the [Department] shall, after notice given pursuant to section eleven and public hearing in the town or city, determine the exemptions required and find that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public....

Thus, a petitioner seeking exemption from a local zoning bylaw under G.L. c. 40A, § 3 must meet three criteria. First, the petitioner must qualify as a public service corporation. *Save the Bay* 366 Mass. 667; *USGen New England, Inc.*, D.T.E. 03-83, at 6 (2004) ("*USGenNE*"). Second, the petitioner must establish that it requires a zoning exemption. *USGenNE,* D.T.E. 03-83, at 6; *Boston Gas Company*, D.T.E. 00-24, at 3 (2001) ("*Boston Gas*"). Finally, the petitioner must demonstrate that its present or proposed use of the land or structure is reasonably necessary for the public convenience or welfare. *USGenNE,* D.T.E. 03-83, at 6; *Massachusetts Electric*

Company, D.T.E. 01-77, at 4 (2002) ("*MECo (2002)*"); *Tennessee Gas Pipeline Company*, D.T.E. 01-57, at 3-4 (2002) ("*Tennessee Gas (2002)*").

A. Public Service Corporation

In determining whether a petitioner qualifies as a PSC for the purposes of G.L. c. 40A, § 3, the Massachusetts Supreme Judicial Court ("SJC") has stated:

> among the pertinent considerations are whether the corporation is organized pursuant to an appropriate franchise from the State to provide for a necessity or convenience to the general public which could not be furnished through the ordinary channels of private business; whether the corporation is subject to the requisite degree of governmental control and regulation; and the nature of the public benefit to be derived from the service provided.

Save the Bay, 366 Mass. 667, 680. *See also*, *Boston Gas*, D.T.E. 00-24, at 3-4; *Berkshire Power Development, Inc.*, D.P.U. 96-104, at 26-36 (1997) ("*Berkshire Power*").

The Department has interpreted this list not as a test, but rather as guidance to ensure that the intent of G.L.c. 40A, § 3 will be realized, *i.e.*, that a present or proposed use of land or structure that is determined by the Department to be "reasonably necessary for the convenience or welfare of the public" not be foreclosed due to local opposition. *See USGenNE,* D.T.E. 03-83, at 7*; Berkshire Power* at 30; *Save the Bay* at 685-686; *Town of Truro* at 407. The Department has interpreted the "pertinent considerations" as a "flexible set of criteria which allow the Department to respond to changes in the environment in which the industries it regulates operate and still provide for the public welfare." *USGenNE,* D.T.E. 03-83, at 7; *Berkshire Power* at 30; *see also Dispatch Communications of New England d/b/a Nextel Communications, Inc.*, D.P.U./D.T.E. 95-59-B/95-80/95-112/96-113, at 6 (1998) ("*Nextel*").

B. Exemption Required

In determining whether exemption from a particular provision of a zoning bylaw is "required" for purposes of G.L. c. 40A, § 3, the Department looks to whether the exemption is

necessary to allow construction or operation of the petitioner's project as proposed. *See USGenNE,* D.T.E. 03-83, at 7; *MECo* (2002), D.T.E. 01-77, at 4-5; *Tennessee Gas* (2002), D.T.E. 01-57, at 5; *Western Massachusetts Electric Company*, D.P.U./ D.T.E. 99-35, at 4, 6-8 (1999); *Tennessee Gas Company*, D.P.U. 92-261, at 20-21 (1993). The petitioner must identify the individual zoning provisions applicable to the project and then to establish on the record that exemption from each of those provisions is required.

C. Public Convenience or Welfare

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. *USGenNE,* D.T.E. 03-83, at 8; *Save the Bay* at 680, *Town of Truro v. Department of Public Utilities*, 365 Mass. 407 (1974). Specifically, the Department is empowered and required to undertake "a broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." *USGenNE,* D.T.E. 03-83, at 8; *New York Central Railroad v. Department of Public Utilities*, 347 Mass. 586, 592 (1964) ("*New York Central Railroad*"). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. *USGenNE,* D.T.E. 03-83, at 8; *Save the Bay* at 685; *New York Central Railroad* at 592.

With respect to the particular site chosen by a petitioner, G.L. c. 40A, § 3 does not require the petitioner to demonstrate that its preferred site is the best possible alternative, nor does the statute require the Department to consider and reject every possible alternative site presented. Rather, the availability of alternative sites, the efforts necessary to secure them, and the relative advantages and disadvantages of those sites are matters of fact bearing solely upon

the main issue of whether the preferred site is reasonably necessary for the convenience or welfare of the public. *USGenNE,* D.T.E. 03-83, at 8-9; *Martarano v. Department of Public Utilities*, 401 Mass. 257, 265 (1987); *New York Central Railroad* at 591.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines: (1) the present or proposed use and any alternatives or alternative sites identified; (2) the need for, or public benefits of, the present or proposed use; and (3) the environmental impacts or any other impacts of the present or proposed use. The Department then balances the interests of the general public against the local interest, and determines whether the present or proposed use of the land or structures is reasonably necessary for the convenience or welfare of the public. *USGenNE,* D.T.E. 03-83, at 9; *Boston Gas*, D.T.E. 00-24, at 2-6; *MECo (2002)*, D.T.E. 01-77, at 5-6; *Tennessee Gas (2002)*, D.T.E. 01-57, at 5-6; *Tennessee Gas Company*, D.T.E. 98-33, at 4-5 (1998).[4]

III. ARGUMENT

A. NEP's Own Analysis Demonstrates That There is No Need for the Proposed Project.

In its Petition for Exemption for Zoning Exemption in Salem, Massachusetts (the "Petition"), NEP asserted a need for the proposed capacitor bank at Salem Harbor based on what appeared to be violations of National Grid's transmission planning criteria for voltage levels. Exh. NEP-JWM at 5. However, the Company's Petition was based on an outdated and, therefore, incorrect set of assumptions used for its loadflow studies. As discussed below, revised

[4] In addition, the Massachusetts Environmental Policy Act provides that "[a]ny determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact" ("Section 61 findings"). G. L. c. 30, § 61. Pursuant to 301 C.M.R. § 11.12(5), Section 61 findings are required if the Secretary of Environmental Affairs has required an Environmental Impact Report ("EIR") for the project.

runs of those studies produced by NEP using updated assumptions demonstrate that there is no need for the proposed capacitor bank.

1. NEP's Design Criterion Is Unambiguous

According to NEP's Transmission Planning Guide, the design criteria range for 115 kV facilities is 0.90 per unit ("p.u.") voltage for the Low Limit and 1.05 for the High Limit. Exh. DTE 1-7, Att. A, Table 2, at C-7. Under cross-examination by the Department, the Company's Principal Engineer in its Transmission Planning Department, Mr. Martin, confirmed that the Company's Low Limit voltage criterion is 0.90 p.u.:

> Q. If you could turn, please, to your response to our Question DTE 1-7, and the attachment, attached National Grid transmission planning guide – on Page C-7 of that attachment, the section Design Criteria. Could you explain, please, which of the criteria on this page would be applicable in this particular case? When you say that design criteria are being violated, which ones?
>
> A. It would be Table 2 [Voltage Range], the bottom line, post-contingency and automatic actions, and the far right columns, 115 kV and below. Where it says low limit per unit, there's a 0.90 number there. That the criteria.
>
> Q. Is that the only criterion on this page that you've identified violations to that you're trying to fix with this project?
>
> A. That's the only one that applies to this part of the transmission system.

Tr. 12-13. The criterion to be applied in this a case, therefore, is whether on occurrence of reasonable contingencies, the voltage in the area will remain within the Company's criterion of no less than 0.90 p.u. Exh. DTE 1-7, Att. A, Table 2, at C-7.

2. NEP's Initial Loadflow Studies Were Based On Outdated System Upgrade Assumptions

a. NEP's Initial Q-V Analyses

According to Mr. Martin, NEP conducted loadflow studies of the North Shore for the period through the year 2012. Exh. NEP-JWM at 4. In those studies, NEP simulated various contingencies and monitored the flow and voltage levels on the transmission lines and substation buses to determine if the flows and voltage levels on all facilities remained within their capabilities. *Id.* According to Mr. Martin, those studies showed that under various contingencies tested, several facilities on the North Shore transmission loop became loaded above their capabilities. *Id.* at 5. However, according to Mr. Martin, those conditions are being addressed by "system modifications outside the scope of this filing." *Id.* Those upgrades involve, among other things, additions of transformers to the Ward Hill substation. Exh. Salem 1-2, Att. A at 24. However, the loadflow studies also produced an analysis of the amount of reactive capability demand and supply versus p.u. voltage available under the simulated contingencies at NEP's switchyard at Salem Harbor. *Id.* The so-called "Q-V analysis" curves identify the p.u. voltage at the switchyard under an array of contingency conditions modeled by NEP.

With its Petition, NEP presented two such Q-V analyses. The first (Exh. NEP-JWM-3) assumed for its baseline (a) no generation whatsoever from Salem Harbor, and (b) one existing transformer at the Ward Hill substation (WHT3) (hereinafter the "Base Case"). Against that baseline, NEP simulated operation of the system with "all lines-in" and then under a variety of contingencies. According to NEP, under the Base Case, the locations on the system that were "representative of voltage conditions that violate or most closely approach the Company's minimum requirements" were two 115 kV buses at King Street:[5]

[5] The King Street area is in Groveland, Massachusetts. Tr. 13, lines 21-22.

BASE CASE

	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	0.973	111.9	0.963	110.7	0.996	114.5
Contingency 1 (WHT3+151)	0.883	101.5	0.870	100.1	0.949	109.1
Contingency 2 (WH G-133+151)	0.753	86.6	0.736	84.6	0.883	101.5
Contingency 3(C-155)	0.890	102.4	N/A	N/A	0.984	113.2

Exh. DTE 1-8(a). Under Contingency 2 in the Base Case, which Mr. Martin characterized as "the worst-case contingency," (Exh. NEP-JWM at 5, line 20), King Street bus 54 had p.u. voltage of 0.753 and King Street bus 55 had p.u. voltage of 0.736. Under those same conditions, the switchyard at Salem Harbor had p.u. voltage of 0.883. Those results are below the design criterion of 0.90.

In the second Q-V analysis (Exh. NEP-JWM-4), NEP assumed for its baseline (a) no generation whatsoever from Salem Harbor, and (b) one additional transformer at the Ward Hill substation (WHT3) (hereinafter the "Upgrade Case"). Again, NEP identified the same two buses at King Street as "representative of voltage conditions that violate or most closely approach the Company's minimum requirements":

UPGRADE CASE

	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	0.986	113.4	0.977	112.4	1.002	115.2
Contingency 1 (Twks 38-94S+151)	0.968	111.3	0.958	110.2	0.992	114.1
Contingency 2 (WH C-155+151))	0.889	102.2	N/A	N/A	0.984	113.2
Contingency 3(WH G-133+151)	0.974	112	0.965	111	0.997	114.7

Exh. DTE 1-8(a). Again, under one contingency (Contingency 2), King Street bus 54 fell below the design criterion at 0.889. King Street bus 55 was unrated because, according to NEP, "the bus was outaged by the contingency." *Id.*

At the request of the Department, NEP generated a third table of Q-V results showing the impact of the proposed project under the baseline conditions assumed by NEP. Exh. DTE 1-8(b). For its baseline, NEP assumed (a) no generation whatsoever from Salem Harbor, (b) one additional transformer at the Ward Hill substation (WHT3), and (c) two new 63 MVAR capacitors installed at Salem Harbor (hereinafter, the (CapBank Case"), with the following results:

CAPBANK CASE

	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	0.997	114.7	0.988	113.6	1.034	118.9
Contingency 1 (Twks 38-94S+151)	0.980	112.7	0.970	111.6	1.025	117.9
Contingency 2 (WH C-155+151))	0.903	103.8	N/A	N/A	1.023	117.6
Contingency 3(WH G-133+151)	0.989	113.7	0.980	112.7	1.031	118.6

Id. With no units running at Salem Harbor, one additional transformer at Ward Hill, and two new 63 MVAR capacitors at Salem Harbor, both of the King Street buses operated at or above the design criteria of 0.90 for all contingencies as did the Salem Harbor switchyard.[6]

i. NEP's Initial Analysis Omitted Planned System Upgrades.

During the evidentiary hearings, two material flaws in NEP's need analysis emerged. First, the Upgrade Case and the CapBank Case assumed that NEP is installing only one new transformer at the Ward Hill substation. Exh. NEP-JWM-4; Exh. DTE 1-8(b). However, under cross-examination, Mr. Martin acknowledged that NEP is planning to install three new

[6] In the CapBank Case which represents what NEP proposed to address the need in this case, the voltage levels at Salem Harbor were less than 119 kV under all contingencies including "all lines in."

transformers at Ward Hill for a total of four. Tr. 36. Mr. Martin also acknowledged that NEP had not generated any Q-V curves assuming three new transformers at Ward Hill. *Id.* This omission was remarkable in light of the fact that approximately two and half months prior to the evidentiary hearings, Mr. Martin co-authored the Northeast Mass (NEMA) Boston Planning Study issued in April, 2004 (hereinafter, the "April 2004 Study"), which concluded that NEP should "install three additional Ward Hill 345-115 kV transformers (T4, T5, and T6)." Exh. Salem 1-2, Att. A at 24. While that conclusion may not have been reached at the time of the filing of the Petition in December, 2003, there was more than ample time between the issuance of the Planning Study and the start of the evidentiary hearings in July to update the Q-V analyses. As an evidentiary matter, the Company's entire case for the need for the capacitor bank through the close of the evidentiary hearings was based on assumptions which the Company knew were outdated.

ii. NEP's Baseline Assumptions Are Not Reasonable with Respect to the Operation of Salem Harbor Station.

In all of NEP's initial analyses (Exh. NEP-JWM-3; Exh. NEP-JWM-4) and in those submitted in response to Record Requests discussed below (Exh. USGenNE-RR-1; Exh. USGenNE-RR-2), NEP assumes in its baseline that not a single unit at Salem Harbor is available as of 2004. Even NEP admitted post-hearing that this is not reasonable:

> The year 2005 results indicate a potential voltage problem if no Salem Harbor generation is running; however, given that ISO-NE has indicated Salem generation needs to be retained until the NSTAR and National Grid projects are completed, the scenario depicted in the year 2005 table is highly unlikely.

Exh. USGenNE-RR-2. Moreover, NEP did not provide any sensitivity analyses to demonstrate what impact the operation of some or all of the Salem Harbor units will have on maintaining the Company's design criterion beyond 2005. Consequently, the record in this case with respect to

the likely impact of Salem Harbor generation on the need for the capacitor banks is, by the company's own admission, clearly wrong through 2005, and incomplete thereafter. This record, therefore, cannot support a finding by the Department that the proposed project is "reasonably necessary."

3. NEP's Updated Q-V Analyses Show All Voltage Levels Within Design Criteria Without the Proposed Capacitor Bank.

In response to USGenNE RR-1, NEP provided updated Q-V curves for the years 2004 through 2007. The baseline assumptions for these curves included the actual upgrades planned by NEP at Ward Hill and elsewhere on the North Shore (but continued to assume no Salem Harbor units operating).[7] The results provided by NEP (Exh. USGenNE-RR-2) for the two King Street buses which presented the "worst case" above and for Salem Harbor are as follows:

2005: NO UPGRADES COMPLETED; NO CAPACITOR BANKS AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2005	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	.976	112.2	.967	111.2	.998	114.8
Contingency 1 (WHT3+151)	.899	103.4	.887	102.0	.957	110.1
Contingency 2 (WH G-133+151)	.774	89.0	.757	87.1	.895	102.9
Contingency 3(C-155)	.895	102.9	N/A	N/A	.986	113.4

Exh. USGenNE-RR-2.

[7] The system upgrades which NEP assumed in its baseline include the following:

- Reconductor the 115 kV overhead lines B-154N and C-155N from Ward Hill to the King Street tap.
- Reconductor the 115 kV overhead line G-133E 3.16 miles from Ward Hill to the East Methuen substation; replace terminal equipment at East Methuen.
- Expand 345 kV at Ward Hill to a breaker and a half arrangement and split the 394 line (Seabrook to Tewksbury) into two sections from Seabrook to Ward Hill and Ward Hill to Tewksbury, referred to for planning purposes as 394N and 394S respectively.
- Install three additional Ward Hill 345-115 kV transformers (T4, T5, and T6).

Exh. USGenNE-RR-1.

2006: WITH UPGRADES; NO CAPACITOR BANKS AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2006 - no Salem capacitors	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	.997	114.7	.988	113.6	1.006	115.7
Contingency 1 (Twks 38-94S+151)	.980	112.7	.970	111.6	.996	114.5
Contingency 2 (WH C-155+151)	.925	106.4	N/A	N/A	.993	114.2
Contingency 3(WH G-133+151)	.995	114.4	.986	113.4	1.005	115.6

Exh. USGenNE-RR-2.

2006: WITH UPGRADES; WITH CAPACITOR BANKS AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2006 - with Salem capacitors	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	1.005	115.6	.996	114.5	1.037	119.3
Contingency 1 (Twks 38-94S+151)	.990	113.9	.981	112.8	1.028	118.2
Contingency 2 (WH C-155+151)	.929	106.8	N/A	N/A	1.029	118.3
Contingency 3(WH G-133+151)	1.005	115.6	.996	114.5	1.037	119.3

Exh. USGenNE-RR-2.

2007: WITH UPGRADES; NO CAPACITOR BANK AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2007 - no Salem capacitors	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	.994	114.3	.985	113.3	1.004	115.5
Contingency 1 (Twks 38-94S+151)	.977	112.4	.967	111.2	.994	114.3
Contingency 2 (WH C-155+151)	.916	105.3	N/A	N/A	.990	113.9
Contingency 3(WH G-133+151)	.993	114.2	.983	113.0	1.003	115.3

Exh. USGenNE-RR-2.

2007: WITH UPGRADES; WITH CAPACITOR BANK AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2007 - with Salem capacitors	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	1.003	115.3	.994	114.3	1.036	119.1
Contingency 1 (Twks 38-94S+151)	.987	113.5	.977	112.4	1.026	118.0
Contingency 2 (WH C-155+151)	.925	106.4	N/A	N/A	1.027	118.1
Contingency 3(WH G-133+151)	1.002	115.2	.993	114.2	1.035	119.0

Exh. USGenNE-RR-2.

The unequivocal conclusion from these updated Q-V curves is that, with the exception of the 2005 results, which NEP itself has discredited (*See* Exh. USGenNE-RR-2), NEP's design criterion of 0.90 is exceeded even at the King Street buses without the proposed project. This conclusion was explicitly confirmed by NEP. Exh. USGenNE-RR-2 (Supp.). Based on the design criterion identified by the Company, NEP has failed to demonstrated a need for the proposed project.

4. NEP Has Mischaracterized the "Required Voltage Level" at Salem Harbor

OP-12 contains a Voltage Schedule for major generating facilities such as Salem Harbor. Exh. DTE-1. The Voltage Schedule for each of the Salem Harbor units for the "Heavy Load Period" is 119 kV, with a Maximum Voltage Schedule of 121 kV and a Minimum Voltage Schedule of 109 kV.

Under cross-examination by the Department, Mr. Martin attempted to dismiss the Minimum Voltage Schedule and Maximum Voltage Schedule as irrelevant to the issue of need in this case, claiming it is

> just an indication of the range that the voltage at Salem Harbor -- the physical equipment could withstand such a range. But for the system to operate properly, you need to be at the scheduled voltage.

Tr. at 20, lines 16 - 20. However, Mr. Martin's testimony is contrary to the explicit language of OP-12:

> During certain conditions at a generating station or on the power system, sustained deviations from the voltage schedules may be required/unavoidable and minimum and maximum voltages have been established that can be sustained at generating stations *during these infrequent conditions* (emphasis supplied).

Exh. DTE-1 at 3 (II. Criteria, A. "Voltage Schedules and Limits for Generators and Key Transmission Stations). In constructing its Q-V curves, NEP assumed in each of its contingency cases the loss of one or more critical transmission resources on the North Shore. The Department can reasonably assume that such contingencies fall squarely within the category of "infrequent conditions" referenced in OP-12. So long as Salem Harbor operates with the Minimum and Maximum Voltage Schedules during contingency conditions, OP-12 is, by its own terms, satisfied. Lest there be any doubt, NEP's own voltage estimates for the proposed project confirm this point. First, using its outdated assumption of only one additional transformer being installed at Ward Hill, the voltage levels at Salem Harbor which NEP was proposing were as follows:

CAPBANK CASE

	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	0.997	114.7	0.988	113.6	1.034	118.9
Contingency 1 (Twks 38-94S+151)	0.980	112.7	0.970	111.6	1.025	117.9
Contingency 2 (WH C-155+151))	0.903	103.8	N/A	N/A	1.023	117.6
Contingency 3(WH G-133+151)	0.989	113.7	0.980	112.7	1.031	118.6

Exh. DTE 1-8(b). Here, the kV voltage levels at Salem Harbor are all above the Minimum Voltage Schedule of 109 kV required by OP-12 but below the 119 kV level which Mr. Martin claimed is necessary for the system "to operate properly." If these lower levels constitute a

violation of the OP-12 standard, as NEP's witness suggested, why would NEP have proposed a project which did not achieve the 119 kV levels with all lines in and under all contingencies?

The same observation holds true with respect to the kV voltage estimates supplied by NEP using the updated assumptions regarding the Ward Hill upgrades and assuming the capacitor bank is installed at Salem Harbor but no Salem Harbor units whatsoever are operating:

2007 WITH UPGRADES; WITH CAPACITOR BANK AT SALEM HARBOR; NO UNITS OPERATING AT SALEM HARBOR

2007 - with Salem capacitors	King St 54		King St 55		Salem Harbor	
Scenario	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)	Voltage (p.u.)	Voltage (kV)
All Lines In	1.003	115.3	.994	114.3	1.036	119.1
Contingency 1 (Twks 38-94S+151)	.987	113.5	.977	112.4	1.026	118.0
Contingency 2 (WH C-155+151)	.925	106.4	N/A	N/A	1.027	118.1
Contingency 3(WH G-133+151)	1.002	115.2	.993	114.2	1.035	119.0

Exh. USGenNE-RR-2. In this case, NEP again implicitly confirms that the 119 kV voltage level is not required to be maintained at Salem Harbor under all contingencies.

If operating above the Minimum Voltage Schedule but below 119 kV is acceptable if NEP builds the proposed capacitor bank (Exh. DTE 1-8(b)), it should be equally as acceptable if NEP does not build the proposed facility. Another of NEP's witnesses, Mr. Fougere, confirmed that facilities are required to operate not at a particular voltage level but "within the bands of voltage levels that we are needing to maintain." Tr. 220. Mr. Fougere testified that a 63 MVAR capacitor bank would not be called on to operate to correct a five MVAR shortfall because "[t]he change wouldn't require -- we're asked to operate between certain limits. Why would we effect a change if we were *within the bands* of the voltage that we are need to maintain?" (Emphasis supplied) *Id.* The criteria should be the same regardless of the outcome for NEP. The proposed project cannot, therefore, be found to be reasonably necessary for the public convenience and

welfare based upon Mr. Martin's mischaracterization of the voltage levels required at Salem Harbor under OP-12.

5. NEP's Estimated Voltage Levels at Salem Harbor Are Not Reasonable

NEP assumed in its analyses, both pre-hearing (Exh. NEP-JWM-3; Exh. NEP-JWM-4; Exh. DTE 1-8) and post-hearing (Exh. USGenNE-RR-1; Exh. USGenNE-RR-2), that no voltage support whatsoever would be available from any of the four Salem Harbor units as of 2004. Even with that assumption, NEP's updated analysis for 2007 with **no** capacitors at Salem Harbor documents voltage levels at Salem Harbor well within the Minimum and Maximum Voltage Schedules of OP-12 for each of the contingency cases. Exh. USGenNE-RR-2 (2007 -- no Salem Capacitors Scenario). Only in the "All Lines In" scenario is there any suggestion of need for additional voltage support at Salem Harbor once the Ward Hill upgrades are completed. However, in order to manufacture that result, one must assume that no support would be available from any of the four of the Salem Harbor units. As Mr. Martin testified, the Q-V analysis, by its nature, does not account for any support from generating units. Tr. 119, lines 22-24; Tr. 120, lines 1-2. While that may be an appropriate starting point for an analysis, the analysis should not end there. As Mr. Martin testified, "the total [support] can come from plant or cap bank or a combination." Tr. 119. As discussed above, NEP has conceded that that is not a reasonable to assume that any Salem Harbor generating units will be retired through 2005. Exh. USGenNE-RR-2. Moreover, counsel for the Company asserted during the hearing that "we are attempting to prove that our project is needed with or without Salem Harbor." Tr. 112, lines 3-5. This they failed to do.

B. The Potential Adverse Impacts of the Proposed Project Outweigh Its Asserted Benefits

In determining whether NEP's proposed project is reasonably necessary for the public convenience or welfare, the Department must also examine the environmental impacts and any other impacts of the proposed use. *See USGenNE*, D.T.E. 03-83, at 9; *Boston Gas*, D.T.E. 00-24, at 2-6; *MECo (2002)*, D.T.E. 01-77, at 5-6; *Tennessee Gas (2002)*, D.T.E. 01-57, at 5-6; *Tennessee Gas Company*, D.T.E. 98-33, at 4-5(1998). NEP has an interest in constructing system upgrades on the North Shore. However, that interest does not create a mandate to build inappropriately sited, inappropriately sized or inappropriately timed structures.

1. If Completed in Advance of the Ward Hill Upgrades, the Project May Have Adverse Impacts on Reliability

On cross-examination by the Department, Mr. Martin testified that certain alternative capacitor bank configurations had been rejected because they would have violated NEP's switching criteria. Tr. 24-25. As Mr. Martin explained, "[w]hen you switch a capacitor bank, the voltage rises. We have a limit as to how far that voltage can change from pre-switching to post-switching." Tr. 25, lines 9-12. Mr. Martin agreed that the design of the 126 MVAR project proposed for installation at Salem Harbor is contingent on the installation of a second transformer at Ward Hill. "The system is stronger with the addition of the second transformer at Ward Hill," Mr. Martin testified, and "a stronger system doesn't react as much to capacitor switching." Tr. 25, lines 16-19. Mr. Martin conceded that NEP may be violating its own switching criteria if the capacitor bank went into operation before the work at Ward Hill was completed. Tr. 26-27. However, he emphasized that it would "acceptable" because it would only be for a short period of time, approximately six months. *Id.* According to Mr. Martin, the proposed in-service date

of the Ward Hill transformer expansion is summer of 2006. Tr. 26, lines 7-11. However, NEP provided no assurance, much less a guarantee, that the period would only be six months.

NEP's intention to operate the capacitor bank even if it violates its switching criteria for a potentially unlimited period of time is not acceptable in light of (a) its potential impact on Salem Harbor's operations and (b) the short lead time required to build a capacitor bank.

a. Impact on Salem Harbor Operations

Based on the current record in this proceeding, it is more likely than not that operation of the proposed 126 MVAR capacitor bank in advance of the completion of the Ward Hill upgrades could interfere with the reliable operation of Salem Harbor. Several months before the start of the evidentiary hearings in this case, USGenNE requested that NEP perform a switching study to determine what impact the proposed capacitor bank would have on Salem Harbor's operation. (Exh. Salem-RR-2, Att. A, at 49-51(request from USGenNE dated April 7, 2004)). NEP ultimately commissioned a Transient Switching Study by E/PRO Engineering & Environmental Consulting, but it was not provided to USGenNE until four months later, well after the close of the evidentiary hearings. Exh. USGenNE-RR-8, Att. A and B. The Switching Study discloses that the voltage changes anticipated from the 126 MVAR capacitor bank are so significant that simple breaker technology cannot be used. Exh. USGenNE-RR-8, Att. B at 2. Rather than employing two simple breakers, two breakers with synchronous closing capability will be needed. *Id.* This raises important and unanswered questions regarding the degree of risk the proposed project will impose on Station operations. First, the Switching Study is void of any information regarding the expected failure rate of the recommended advanced synchronous breaker system. Synchronous breakers manage the closing of each of their three phase contacts independently (Exh. USGenNE-RR-8, Att. B at 2), which implies to USGenNE a tripling of complexity and a possible increase in failure rates over a standard breaker system. Second, it is

unclear what assumptions were made in the Switching Study regarding the Ward Hill upgrades set forth in the April 2004 Study. If all of the upgrades are assumed to have been implemented prior to the operation of the capacitor bank, the results of this Switching Study may understate the risk to Salem Harbor.

Finally, as discussed above, absent the addition of tranformer capacity at Ward Hill, the operation of the proposed project may cause NEP's switching criteria to be violated and cause units at Salem Harbor to trip off line. As Mr. Martin testified, ". . . the last thing you would do in an import-constrained area is to back down generation." Tr. 106. By the same token, the last thing the Department would want to do in an import-constrained area is approve a zoning exemption for a facility that is not only is not needed, but which could interfere with the reliable operation of Salem Harbor's generating units.

b. There is no need to put the cart before the horse.

According to NEP, the construction phase for its proposed project is six months, with three months for testing. Tr. 199-200. Were NEP able to demonstrate a need for voltage support at Salem Harbor at some future date, the project does not have a long lead time. Given that NEP has not demonstrated a need for voltage support at Salem Harbor, and given that the Ward Hill upgrades will not be completed until at least the "summer of 2006," there is no public benefit to be derived from a project whose operation has the capacity to violate NEP's own switching criteria and potentially interfere with the operation of Salem Harbor Station.[8]

[8] Even the testing phase of the project can lead to tripping of USGenNE's generating units off line. Tr. 217, line 16-24; Tr. 218, lines 1-2.

2. NEP's Proposed Four Week Outage for Salem Harbor Unit 4 in Late-2005 Is Adverse to the Public Convenience and Welfare

Under cross-examination, the Company's witness, Mr. Fougere, revealed that the proposed project requires a two- to four-week outage of Salem Harbor's Unit 4.[9] Tr. 251-253. According to Mr. Fougere, NEP never discussed the need for a two- to four-week outage with Salem Harbor:

> Q. Are you aware that the maintenance schedules for 2005 have already been submitted to ISO?
>
> A. [FOUGERE] For 2005?
>
> Q. Yes.
>
> A. [FOUGERE] I am not aware of that.
>
> Q. Have you discussed the need for a two-to-four-week outage of Unit 4 with Salem Harbor?
>
> A. [FOUGERE] Not at this point.

In fact, NEPOOL Operating Procedure 5 requires that the Annual Maintenance Schedule for the next year be published on about each June 1st of the prior year. Exh. NEP-RR-2, Att. A, 5 ("First Future Year - Annual Maintenance Schedule"). "This schedule is intended to provide Participants and the ISO sufficient lead-time to schedule all Planned Outages for the next calendar year." *Id.* In order to meet that schedule, USGenNE submitted its requested maintenance schedule on May 12, 2004 and it was approved on June 9, 2004. Exh. NEP-RR-2 at 1. Although the precise dates of Salem Harbor's planned outage for 2005 are confidential, the outage will be completed well before the late summer, early fall time frame assumed by NEP. Exh. NEP-RR-2 at 2. For the reasons set forth in the Affidavit of the Michael A. Fitzgerald, the

[9] Unit 4 constitutes more than half of the installed capacity at Salem Harbor. (See Lagging Reactive Capabilities, Exh. DTE 1-10.)

General Manager of Salem Harbor Station, its is highly unlikely that the outage schedule for 2005 can be altered at this time to accommodate NEP's assumed two- to four-week outage. *Id.* Nor is it economically feasible or in the public interest to subject Unit 4 to an additional outage in 2005 for this purpose. Electricity consumers in the capacity-constrained regions of the North Shore and the Greater Boston Import Area should not have to forego access to Salem Harbor Unit 4 to accommodate the construction of a capacitor bank, particularly one which is not needed.

C. No Alternatives to the Proposed 126 MVAR Capacitor Bank Were Analyzed After the Filing Was Corrected

NEP's analysis of alternatives to meet the asserted "need" was performed prior to NEP correcting its assumptions regarding Ward Hill upgrades. Exh. NEP-JWM at 6, lines 8-23; Exh. NEP-JWM-4. To bring the very low p.u. voltage levels which it calculated at the King Street buses above the 0.90 Minimum, NEP determined that a 126 MVAR capacitor bank was needed. Exh. NEP-JWM at 6, at lines 1-6. However, after correcting its assumptions regarding upgrades at Ward Hill, the "need" at King Street evaporated as it did in all of its other contingency cases. USGenNE-RR-2.[10] Inexplicably, the Company continues to trudge forward with its 126 MVAR capacitor bank proposal. Even when the 126 MVAR capacitor bank caused overvoltage problems when modeled at King Street, the Company did not analyze or discuss the use of smaller capacitors there or elsewhere or a change in project schedule. Exh. USGenNE-RR-3 (Supp.).

Although an applicant for a zoning exemption under G.L. c. 40, § 3 need not prove that its proposal is the best possible alternative, the applicant must present sufficient data for the

[10] "Review of the King Street voltages with the proposed upgrades as outlined in response to USGen RR-1 indicated no additional voltage support needed at King Street in the year 2006 or 2007." *Id.*

Department to consider the relative advantages and disadvantages of the alternatives considered. *USGenNE*, D.T.E. 03-83, at 8-9; *Martarano v. Department of Public Utilities*, 401 Mass. 257, 265 (1987); *New York Central Railroad* at 591. Because NEP did its alternatives analysis prior to correcting its modeling assumptions regarding Ward Hill, its initial analysis is of no evidentiary value. After rerunning its loadflow study with the correct assumptions for Ward Hill, NEP did not offer any alternatives for the Department's evaluation. Therefore, NEP's filing does not satisfy even the barebones requirements of G.L. c. 40A, § 3 with respect to consideration of alternatives.

IV. CONCLUSION

In *USGenNE*, the Department cautioned future applicants of zoning exemptions as follows:

> . . . we emphasize that petitioners seeking a zoning exemption must demonstrate, in accordance with G.L. c. 40A, § 3, that the "present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public." Not all projects undertaken by public service corporations will meet this test.

See USGenNE, D.T.E. 03-83, at fn 9. The Department was prescient. This is undoubtedly one of them.

Based on the evidentiary record in this case, and for all of the reasons set forth above, USGenNE requests that the Department find that NEP has not met its burden to demonstrate that the proposed capacitor bank is reasonably necessary for the convenience or welfare of the public.

If, however, the Department inexplicably finds on this record that the proposed project is reasonably necessary for the convenience or welfare of the public, USGenNE requests that the grant of a zoning exemption be conditioned on the following:

(1) NEP's installation of all of the protective devices assumed and recommended in the Transient Switching Study (Exh. USGenNE-RR-8);

(2) NEP's implementation of the same conditions imposed on USGenNE in the City of Salem's Site Plan approval (Exh. Salem 1-30, Att. B);

(3) NEP's completion of the necessary tie-in with respect to Unit 4 during a scheduled outage approved for Salem Harbor's Unit 4;

(4) NEP's commitment to review all aspects and impacts of the capacitor bank design and construction to ensure consistency of plans with USGenNE; and

(5) NEP's receipt of all necessary permits and approvals for the proposed project.

Respectfully submitted,

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